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AUTHOR Shea, Joseph
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ABSTRACT

This experiment was conducted to determine whether preservice teachers taking a combination of Minicourses and student teaching (the experimental group) would develop greater teaching skills than teachers taking only student teaching (the control group). Pre- and post-video tapes of their teaching performances were scored and compared using analysis of covariance. It was found that, compared to the control group, experimental-group teachers repeated pupil answers less often, answered their own questions less often, and used more higher-cognitive questions in discussions. In tutoring sessions, they used more diagnostic questions, verbal praise, demonstration techniques, and evaluation. The overall significance of this experiment is that it serves as a demonstration that microteaching as a specialized technique, and Minicourses as an adaptation of it, can be used effectively, within certain limits, in training preservice teachers. (Author/JA)

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THE RELATIVE EFFECTIVENESS OF STUDENT TEACHING VERSUS A COMBINATION OF STUDENT TEACHING AND MICROTEACHING

Joseph Shea, University of Florida

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Objectives

The minicourse represents a promising new method of inservice teacher education. Minicourses are self-instructional microteaching packages developed by the Far West Laboratory for Educational Research and Development. Although a substantial body of research indicates that they are effective in changing the teaching behavior of inservice teachers, few studies have been conducted to determine their effectiveness with student teachers. Also, no studies have been done to determine the effects of several Minicourses administered consecutively to same group of teachers. The purpose of this experiment, then, was to determine the effectiveness of several Minicourses administered consecutively in conjunction with a student teaching program.

Background

The basic format of the Minicourse instructional model is the microteaching approach developed at Stanford University and employed in the Stanford Intern Program. The basic elements of this approach include: 1) presenting the intern with a clearly delineated teaching skill to be mastered; 2) providing an opportunity for the intern to practice the skill in a brief, (5 to 10 minute), lesson with five to six pupils: 3) observation and subsequent analysis of the intern's performance by videotape feedback and/or supervisors, and 4) provision for further practice through reteaching the same skill with another small group of pupils. Studies of this approach have found microteaching to be more efficient and at least as effective as conventional teaching programs, (Allen and Fortune, 1966; Kallenbach and Gall, 1969). While the Minicourse model utilizes

the basic microteaching approach outlined above, recent research findings have brought about important modifications which give it a distinctive character: 1) using film-mediated models, (Bandura, 1963; Orme, 1966); 2) providing for feedback and practice through self-evaluation of videotape playback, (Acheson, 1964; Borg, 1970), and 3) use of sophisticated film-production techniques, (McDonald and Allen, 1967). The effectiveness of the microteaching approach, and its adaptation in Minicourses, probably stems from the fact that its procedures are based on sound learning principles: use of behaviorally defined teaching skills, modeling, practice and feedback. A number of studies including this one, are currently being conducted to determine the range of teacher training situations in which Minicourses and microteaching are effective. The question raised by this study was whether student teachers taking a combination of Minicourses and student teaching could perform the specific Minicourse teaching skills at a significantly higher level of effectiveness than student teachers devoting an equal amount of total time to student teaching only. It also seemed important to determine if the use of the Minicourses might be responsible for increasing overall teaching effectiveness.

Method

The study was carried out at the University of Florida and involved twenty-four elementary student teachers who were scheduled to teach in three local schools. Student teachers were randomly assigned to experimental and control groups so that in each school there were four, (2 experimental, 2 control), at the primary grade level and four, (2 experimental, 2 control), at the intermediate grade level.

The plan for the study required that each of the experimental subjects

participate in three Minicourses in the following order: Minicourse 1: Effective Questioning, Elementary Level; Minicourse 5: Individualizing Instruction in Mathematics; Minicourse 9: Higher Cognitive Questioning. The treatment consisted of having experimental subjects devote three and one half hours daily to student teaching and one and one half hours daily to Minicourses. Control subjects devoted their entire five hour day to student teaching.

The Minicourses, (1,5, and 9), used in this study were self-instructional packages of 4 lessons each, however only the last two lessons of Minicourse 9 were used due to similarity in the material of these lessons and that contained in Minicourse 1. Completing these 10 lessons comprised the treatment. For each lesson the 12 student teachers in the treatment group (1) viewed instructional and model films demonstrating behaviorally defined skills, (2) practiced these skills in a videotaped microteach lesson, (3) replayed and evaluated the videotaped lesson, and (4) repeated steps 2 or 3 as needed. Microteach groups consisted of 5 pupils for Minicourses 1 and 9. However, for Minicourse 5, student teachers tutored, in turn, "one pupil on number operations (e.g. addition, subtraction) and another pupil on verbal reasoning problems. Twelve additional student teachers comprised the control group. Mean age and grade levels taught by the two groups are shown in Table 1.

Data Collection

Each experimental and control subject conducted a videotaped discussion lesson or tutoring session at his school in a nearby classroom set aside for this purpose. Subjects were videotaped before and after training in each of the three Minicourses. The exception was Minicourse 9 where a pretest

was not administered since the posttest for Minicourse I provided a suitable pretest for this course. The pre-and posttapes were then each scored by two trained raters for occurrences of questioning or tutoring behaviors covered in the Minicourses. Interrater reliability over 18 different techniques varied from .72 to .99, with the majority being above .85. Analysis of covariance, with pretest scores as the covariate and gain scores as the dependent variable, was used to determine whether significant differences between experimental and control groups occurred on the posttest. Reliability coefficients for scoring Minicourse pre and post video-tapes are presented in Table 2.

Results

Minicourse I generally was not effective in changing the behavior of the experimental group teachers compared to the control group. Table 3 summarizes the results of the comparisons of the two groups on Minicourse I. For 7 of the 10 behaviors studied there was little difference between the two groups. Behaviors such as redirection, prompting, clarification, elicitation of longer pupil answers and reduction in the number of one-word pupil answers appear to have been unaffected by training. Both groups were still high in percentage of teacher talk and - while a slight decrease is noted for the experimental group compared with a somewhat greater increase for the control group - teachers in both groups still talked at least sixty percent of the time. However, Minicourse I did enable the experimental group to lessen their use of negative habits such as repeating and answering their own questions and repeating pupil answers.

The main purpose of Minicourse 9 is to increase teacher's use of higher cognitive questions. The data analysis in Table 4 revealed that the course was successful in achieving this goal. On the posttape after Minicourse I, an average of 45 per cent of the experimental groups questions were rated as higher cognitive. After training in Minicourse 9, this percentage increased

to 72 per cent. In contrast, the corresponding percentages for the control group were 25 percent and 37 percent.

Minicourse 5 proved to be an effective training method for increasing student teachers' use of tutoring skills. This Minicourse provided training in the use of specific teaching skills designed to individualize instruction in mathematics. A comparison of the performance of the two groups of student teachers is presented for each of these skill areas; (1) diagnostic questions, (2) demonstration techniques, and (3) verbal praise.

Diagnostic Questions. Diagnostic questions are general questions which test pupils' understanding of concepts and procedures necessary for solving a particular problem. Five types of diagnostic questions were scored as to use by the student teachers in each of their tutoring sessions. The results shown in Table 5 indicate that the experimental group increased significantly from pretape to posttape in their use of such questions.

Demonstration Techniques. Minicourse 5 provides instruction in the use of teaching procedures (estimation, expanded notation, number line, manipulative materials, diagrams and pictures, number sentences) designed to help pupils improve their number operations skills and their verbal reasoning ability. Raters obtained a pre-post count of the number of such techniques used as well as the amount of time spent in their use. Table 6 shows that there was little actual difference between the two groups in the amount of time spent using demonstration techniques. However, as noted in Table 7, the experimental group made much more extensive use of demonstration techniques in the tutoring sessions.

Verbal Praise. As used in Minicourse 5, verbal praise consists of verbally rewarding a student who has given the desired or correct response, i.e. "good", "fine", "that's right". Raters noted the frequency of use of verbal praise

statements by teachers in the two groups. Table 8 shows that the experimental group student teachers made more extensive use of verbal praise as a result of their participation in Minicourse 5. In addition, this group showed a corresponding decline, however the differences were small and not significant.

A second purpose of the study was to determine the relative effects of Minicourse - student teaching experience upon measures of teacher effectiveness. To determine teaching effectiveness, the Stanford Teacher Competence Appraisal Guide was administered to each of the subjects following completion of the three Minicourses. The Teacher Competence Guide is a rating scale consisting of 17 items each descriptive of an aspect of teacher performance, with behavioral description provided to facilitate scoring. The 17 items are each scored on a 7-point scale with 7 the highest value. Table 11 presents data comparing mean ratings of teaching performance assigned to student teachers in the two groups by their respective supervising teachers. From Table 9 it can be seen that the experimental group did not differ significantly in mean ratings from the control group. The respective mean ratings of 4.28 and 4.02 do indicate that the entire student teacher group was perceived as being well above average in their teaching performance.

Interpretation and Significance

The results of this experiment indicate that the combination of Minicourses and student teaching enabled teachers to perform certain teaching skills at a significantly higher level of effectiveness than was possible for student teachers not exposed to Minicourses. However, it appears in retrospect that the completion of only two Minicourses during a ten-week period would be more satisfactory than the three Minicourses completed in this study.

In general primary grade student teachers encountered greater difficulty in attempting to complete the Minicourses and incorporate the skills learned into their teaching. Especially difficult were the attempts by primary student teachers to initiate and sustain the discussions called for by Minicourses 1 and 9 with first and second grade pupils.

The overall significance of this experiment is that it serves as a demonstration that microteaching as a specialized technique, and Minicourses as an adaptation of it, can be used effectively, within certain limits, in training preservice teachers. It is an effective adjunct to student teaching for the specific purpose of increasing use of specific classroom skills or eliminating negative teaching habits.

TABLE 1

MEAN AGE AND GRADE LEVELS TAUGHT
FOR PARTICIPATING TEACHERS

TREATMENT GROUP	NUMBER OF TEACHERS	MEAN AGE (Years)	GRADE LEVELS TAUGHT					
			1st	2nd	3rd	4th	5th	6th
Experimental	12	25.70 (S.D.=7.87)	3	2	1	3	3	2
Control	12	23.39 (S.D.=4.71)	2	2	2	1	3	2

TABLE 2

INTERRATER RELIABILITY COEFFICIENTS FOR SCORING MINICOURSE PRE AND POST VIDEOTAPES

MINICOURSE	BEHAVIOR SCORED	PRODUCT-MOMENT CORRELATION	N[1]
ONE	REDIRECTION	.94	48
ONE	PROMPTING	.89	48
ONE	CLARIFICATION	.93	48
ONE	REPEATS OWN QUESTION	.77	48
ONE	ANSWERS OWN QUESTION	.90	48
ONE	REPEATS PUPIL RESPONSE	.95	48
ONE	LENGTH of PUPIL RESPONSE	.96	48
ONE	NUMBER ONE WORD RESPONSES	.99	48
ONE	PROPORTION TEACHER TALK	.99	48
ONE and NINE	PROPORTION of HIGHER ORDER QUESTIONS	.93	24
FIVE	ASKING DIAGNOSTIC QUESTIONS		
	A. Number Operations	.81	48
	B. Verbal Problems	.785	48
FIVE	USING DEMONSTRATION TECHNIQUES		
	A. Number Operations	.785	48
	B. Verbal Problems	.87	48
FIVE	EVALUATION[2]	.75	48
FIVE	PRACTICE[2]	.72	48
FIVE	USING VERBAL PRAISE[2]	.94	48
FIVE	TYPES of VERBAL PRAISE USED[2]	.75	48

1. N= Number of sessions scored.

2. Number Operations and Verbal Problems are combined.

TABLE 3

SUMMARY DATA AND VARIANCE ANALYSIS
FOR MINICOURSE ONE PRE AND POST TAPES

MINICOURSE 1 BEHAVIORS	MEAN SCORES EXPERIMENTAL PRE	EXPERIMENTAL POST	CONTROL PRE	CONTROL POST	F
Number of times teacher used redirection.	8.03 (SD=5.94)	19.33 (SD=10.11)	12.83 (SD= 8.68)	17.78 (SD=8.42)	1.74
Number of times teacher used prompting	3.54 (SD=3.81)	2.38 (SD= 2.13)	3.71 (SD= 3.54)	2.79 (SD=3.62)	.127
Number of times teacher used clarification	6.83 (SD=5.61)	4.92 (SD= 3.84)	6.97 (SD= 6.66)	5.13 (SD=3.94)	.014
Number of times teacher repeated own question	1.33 (SD=1.59)	.92 (SD= 1.68)	.83 (SD= .95)	1.50 (SD=2.21)	.477
Number of times teacher answers own question	1.67 (SD= .75)	.83 (SD= .63)	.96 (SD= 1.14)	1.42 (SD=1.80	4.47*
Number of times teacher repeats pupils answers	8.35 (SD=6.87)	2.75 (SD= 6.42)	11.17 (SD= 6.82)	11.63 (SD=6.05	10.00*
Length of pupil responses in words	8.78 (SD=1.91)	7.16 (SD= 3.25)	8.28 (SD= 5.06)	5.58 (SD= .58)	1.58
Number of one-word pupil responses	7.67 (SD=2.93)	11.92 (SD= 8.10)	11.58 (SD=10.78)	17.25 (SD=9.74)	.946
Proportion of teacher talk	.61 (SD= .11)	.60 (SD= .20)	.63 (SD= .17)	.67 (SD= .17)	.65
Proportion of higher order questions asked.	.57 (SD= .61)	.46 (SD= .23)	.52 (SD= .25)	.25 (SD= .25)	4.44*

* $P < .05$
** $P < .01$

TABLE 4

USE OF HIGHER ORDER QUESTIONS BEFORE AND AFTER MINICOURSE ONE AND AFTER MINICOURSE NINE

TREATMENT GROUP	NUMBER of TEACHERS	PERCENTAGE OF STUDENT TEACHERS USING HIGHER ORDER QUESTIONS		
		Minicourse One		Minicourse Nine
		Before	After	After
Experimental	12	57%	45%	72.42%
Control	12	52%	25%	37.25%

TABLE 5

FREQUENCY OF DIAGNOSTIC QUESTIONS BEFORE AND AFTER MINICOURSE FIVE
(Number Operations and Verbal Problems)

TREATMENT GROUP	NUMBER of TEACHERS	MEAN NUMBER QUESTIONS Before	After	F
Experimental	12	10.30 (SD. 6.50)	18.70 (SD. 5.30)	
Control	12	13.90 (SD. 8.40)	17.30 (SD. 7.0)	5.16*

* $P < .05$

TABLE 6

AMOUNT OF TIME SPENT USING DEMONSTRATION TECHNIQUES
BEFORE AND AFTER MINICOURSE FIVE

TREATMENT GROUP	NUMBER of TEACHERS	MEAN NUMBER of MINUTES Before	After	F
1. Number Operations				
Experimental	12	3.25 (SD. 2.89)	3.58 (SD. 2.65)	
Control	12	3.68 (SD. 3.43)	2.34 (SD. 3.02)	1.05
2. Verbal Problems				
Experimental	12	2.93 (SD. 3.06)	3.72 (SD. 3.16)	
Control	12	2.09 (SD. 2.82)	2.39 (SD. 3.53)	.439

TABLE 7

NUMBER OF DEMONSTRATION TECHNIQUES
USED BEFORE AND AFTER MINICOURSE FIVE

TREATMENT GROUP	NUMBER OF TEACHERS	MEAN NUMBER TECHNIQUES Before	After	F
1. Number Operations Session				
Experimental	12	1.25 (SD. .87)	2.33 (SD. 1.37)	
Control	12	1.50 (SD. 1.09)	1.42 (SD. .79)	4.56*
2. Verbal Problems Session				
Experimental	12	1.00 (SD. .60)	2.16 (SD. .72)	
Control	12	.92 (SD. .90)	1.08 (SD. 1.00)	9.51**

* $P < .05$
** $P < .01$

TABLE 8

FREQUENCY OF VERBAL PRAISE BEFORE AND AFTER MINICOURSE FIVE

MEASURE	NUMBER of TEACHERS	MEAN FREQUENCY Before	After	F
Frequency of Praise				
Experimental	12	12.50 (SD. 11.30)	16.30 (SD. 7.60)	
Control	12	15.83 (SD. 7.5)	11.20 (SD. 5.4)	6.03*
Types of Praise				
Experimental	12	3.2 (SD. 1.4)	3.5 (SD. 0.7)	
Control	12	4.0 (SD. 1.5)	3.7 (SD. 1.6)	.38

* $P < .05$

TABLE 9

RATINGS OF TEACHING PERFORMANCE FOR
EXPERIMENTAL AND CONTROL STUDENT TEACHERS

TREATMENT GROUP	NUMBER OF TEACHERS	MEAN RATING SCORES	F
Primary			
Experimental	6	4.51 (SD. .730)	
Control	6	3.80 (SD. 1.34	2.56
Intermediate			
Experimental	6	4.06 (SD. .91)	
Control	6	4.25 (SD. .82)	.5081
Primary and Intermediate			
Experimental	12	4.28 (SD. .82)	
Control	12	4.02 (SD. 1.11)	.0411

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